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elaborating the complex impressions of the muscular and the stereognostic senses. The "intermediate pre-central" field is in front of the pre-central area proper and extends downwards to the orbital surface of the hemisphere. It includes the well known area of Broca, the centre for speech. He partially postulates a separate writing area in this field, as he found cell changes in a case of amputation of the right hand, thus agreeing with Bianchi's theory. One of its chief functions seems to be the control of high and low evolutionary movements, this being so well marked that he states the following "Law:" "in the intermediate pre-central cortex there is a sequential deposition of centres for the control of higher evolutionary movements, following the same order from above downwards as that observed in the precentral area proper." The frontal and prefrontal areas are electrically "silent;" they seem to be the seat of the high cerebral functions, making up the "psychical tone" of the individual. Removal or disease seems to disaggregate the personality, peculiar forms of mental disturbance and alterations of character occur, the "Witzelsucht" of the German writers. In cases of dementia, the greatest cerebral wasting occurs in this region, varying directly with the amount of mental defect. In other words, the higher psychic and association functions seem to be localized in this area; witness the atrophy in idiocy, imbecility, general paralysis and in some cases of dementia præcox. The data of comparative anatomy also bears out this hypothesis. The island of Reil is phylogenetically very old, it probably represents the gustatory centre and it has been found altered in cases of aphasia. The addendum comprises the comparative anatomy and physiology of the brains of the cat, dog and pig. The plates are well drawn and graphically represent the views of the writer on all the points discussed. In view of the thorough work, it is to be hoped that the author will apply his methods (complete studies of serial sections over entire areas) to the study of the basal ganglia, the deeper parts of the cortex and various nerve tracts. I. H. CORIAT.

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*The Analysis of Racial Descent in Animals*, by T. H. MONTGOMERY  
Henry Holt & Co., New York, 1906. pp. 311.

The author discusses environmental modes of existence, hereditary and embryonic differentiation, relations of modes of reproduction and conjugation, life cycles and polymorphism of individuals, variation and mutation, transmutation of species, parallelism of ontogeny and phylogeny, morphological comparisons, relative values of morphological characters and criteria of racial advancement. Each vital phenomena he considers a step in the individual or racial change. If the morphologist regards structure as a visible stage of progress, there can be no conflict between him and the physiologist. If we knew what form meant we should interpret it into function. Interpretations of descent have hitherto been too morphological. They should include chemical and physical constitution and environment, and especially the relative value of characters implied, the criterion of which is the degree of conservatism, should never be lost sight of. We must assume monophyletic origin until the opposite is proven. We must anticipate intermediate connectants between species, must consider modifications due to stimulating changes in the environment, and deem hereditary substance not excluded from external influence. The individual does not recapitulate the development of the race, and no particular ontogenic stages are more ancestrally remnant than others, but all stages of ontogeny are equally cenogenetic and palin-

genetic. To become inherited, a modification must produce changes in the energy of the germ plasm. All comparisons between diverse mechanisms are inexact analogies, but in most phylogenetic research we must base upon these. The unit of comparison is the whole individual during its life history and not any selected stage of it. The author inclines very strongly to Hatschek's trochophore theory, viz., that the free larvæ of marine annelids show uniformity of structure and these are all modifications of one kind. The earlier the modifications appear the more apt they are to be inherited. If the free swimming larvæ were a repetition of an ancestral adult condition, why should it not be equally conserved in marine and fresh water life?

*Die Ameise*, von K. ESCHERICH. Vieweg & Sohn, Braunschweig, 1906. pp. 232.

The author has here gathered the main results of the studies of nearly half a century and presented them in a systematic, critical way with 68 illustrations. The one great family of formicidæ comprises over five thousand species, sub-species and varieties. There are 170 genera and 5 great sub-families. There are enormous variations. The distribution of ants is almost worldwide between the polar circles. Although their optimal habitat seems to be the tropics, they have sometimes transcended both the Antarctic and the Arctic circle. They have a very common trait of founding states or colonies and the sterile female is greatly in evidence in all the species. While ants are no miniature men, they are no mere reflex automata, but have the psychic qualities of memory, association, perception, utilization of individual sense experience, and thus power of individual plastic adaptation. The latter is most pronounced among the workers, less with the queens and is almost undeveloped in the males. This difference has a very marked reflection in the structure of the brain which differs very much, the gray matter being far more developed in the workers. Something is known of their phylogeny. They long antedated man. Our author thinks that the first ants were winged and that they very slowly lost this trait, but that some species have reverted to wings, remarkable as this is. He also assumes that polymorphism had a slow development and is largely tropogenic. Wasmann has shown that the appearance of pseudogynes has a casual relation with the presence of certain guests of ants. These lived with them first in the symphilia. They were first received, they grew up in the nests and last the ants cared for them. These later destroyed the eggs and larvæ of their hosts. When the first workers appeared, there was, of course, an important change in the habits of these ants. Another phyletic trait is the slow development of the *Pilzgarten*. The writer believes that we can trace pretty directly the development of every stage of this process. He also has something to suggest about the instinct of feigning death, but the most important phyletic contribution is the writer's theory of eight stages in the development of the colonies, illustrated by as many different species. In this way he accounts for slavery, domestication and the development of mixed colonies. He deems that his results are borne out by the experiments of mixing species. On the whole this must be called quite a masterly compend.

*Die Mimik des Denkes*. Von DE SANCTIS. Halle, 1906.

De Sanctis reminds us that the reflexes, pulse, respiration, the pupil, respond with exquisite sensitiveness to psychic states. Thought mimesis comprises first that of sensory attention and second more intellectual inner reflection. The apparatus chiefly involved is the seventh pair of facial nerves, the root of which arises between the